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1 **CONTROLLER OF FAN FOR COOLING COMPRESSOR OF REFRIGERATOR**

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CLAIMS

[Claim(s)]

[Claim 1] In what equipped with the fan for compressor cooling the machinery room which stores the compressor of a refrigerator While providing the delay timer function to drive or stop the fan for cooling who did definite-period-of-time progress from starting or a stop of a compressor on the microcomputer for control of the above-mentioned refrigerator The control device of the fan for compressor cooling of the refrigerator characterized by leading the detection value from an air temperature probe to the above-mentioned microcomputer for control, closing a delay timer function as compared with the predetermined preset value beforehand set as the microcomputer for the said control when the above-mentioned detection value exceeds the above-mentioned preset value, and driving the fan for cooling.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the control device of the fan for compressor cooling of a refrigerator.

[0002]

[Description of the Prior Art] The domestic refrigerator is enlarged in recent years. The fan for cooling is prepared in the machinery room which stores a compressor in order to prevent the overtemperature of a compressor. A cooling fan is operated synchronizing with operation of a compressor, and there are some which are shown in JP,H4-1379,U as a control device of the fan for compressor cooling of the conventional refrigerator who has secured operation which suppressed the rise in heat of the compressor, and where the refrigerator was stabilized.

[0003] The control device of the fan for compressor cooling of the above-mentioned conventional refrigerator is explained hereafter, referring to Drawings.

[0004] First, in drawing 5 , in the machinery room formed in the lower part on the back of a refrigerator, a compressor 23 is fixed to a mount through the rubber cushion 24, indoor cold is inhaled near the compressor 23, and the fan 25 for cooling who sprays towards a compressor 23 is attached.

[0005] In the terminal box 26 of a compressor 23, in order to prevent overheating of a compressor 23, the thermal protector (not shown) was attached, the input was intercepted by overheating of the compressor 23 and destruction by overheating of a compressor 23 is prevented.

[0006] It is [the temperature sensor 28 for compressors, and the temperature sensor 29 for discharge pipes] close, they are attached to the case upper part of a compressor 23, and the discharge pipe 27 of a compressor 23, and the signal wire is connected to them in the port for sensors of the microcomputer 30 for control.

[0007] The control device of the fan for compressor cooling of the refrigerator constituted as mentioned above and the following explain the operation.

[0008] Drawing 6 is the block diagram of the control part of a refrigerator, and the microcomputer 30 for control memorizes the control mode of a refrigerator with the signal from the operation input circuit 31. An A/D conversion is carried out with the A/D conversion machine 32 which contains the detection value sent from the temperature-inside sensor attached in the refrigerator warehouse in the microcomputer 30 for control. As compared with each preset value beforehand set as the microcomputer 30 for control, if one of detection values exceeds each preset value (drawing 7 temperature line d), a cooling fan will be driven and a compressor 23 will be cooled.

[0009] Although a preset value d changes with the performance of a compressor 23, and designs of a refrigerant circuit, it is set below to the maximum temperature (drawing 7 temperature line c) which guarantees normal operation of a compressor 23.

[0010] Drawing 7 is time CHITO which shows the temperature change of operational status and a compressor 23 for the fan 25 for cooling accompanying operation and a stop of a compressor 23. The compressor 23 of a refrigerator repeats on-off control periodically with the microcomputer 30 for control, and the temperature of the compressor 23 shows a high temperature periodically like Curve A.

[0011] Simultaneously with starting of a compressor 23, the microcomputer 30 for control takes in the detection value from the temperature sensor 28 of a compressor 23, or the temperature sensor 29 of the discharge pipe 27. As compared with each preset value d beforehand set as the microcomputer 30 for control, when the detection value of either or both exceeds a preset value d, the fan 25 for cooling is driven, and it is controlling to stop the cooling fan 25, when a compressor 23 cools and each detection value is less than a preset value d.

[0012] Furthermore, by the delay timer function 33, after carrying out definite-period-of-time

progress from starting of a compressor 23, the temperature of a compressor 23 is not related how, but the fan 25 for cooling is driven, and a compressor 23 is cooled.

[0013] When a compressor 23 is cooled and the detection value from the temperature sensor 28 or the temperature sensor 29 is less than each preset value d, the microcomputer 30 for control stops the fan 25 for cooling.

[0014] Thus, while the fan 25 for cooling is operating, the rise in heat of the compressor 23 was suppressed below at the marginal temperature c, was maintained at the state of the curve B below a marginal temperature lower than the curve A in the state where the fan 25 for cooling is not used, and has prevented overheating of a compressor 23.

[0015] If a compressor 23 stops by the temperature control of a refrigerator, after carrying out definite-period-of-time progress by the delay timer function 33 of the microcomputer 30 for control, the fan 25 for cooling will be stopped.

[0016] When the temperature of a compressor 23 is not less than a predetermined marginal temperature (temperature line e) at this time, the microcomputer 30 for control closes the delay timer function 33, and he is trying to continue operation of the fan 25 for cooling.

[0017] [with thus, the delay timer function 33 of temperature detection of a compressor 23 or the discharge pipe 27, and the microcomputer 30 for control] The proper operational status of a compressor 23 can be held by controlling the fan 25 for cooling, without being influenced by temperature change of the quality of ventilation by the setting position of a refrigerator, and the compressor 23 by a season.

[0018] If a compressor 23 starts as shown in the flow chart of drawing 8 (Step 34) The delay timer function 33 of the microcomputer 30 for control starts (Step 35). The case upper part of a compressor 23 or the temperature of the discharge pipe 27 rises until it carries out predetermined time progress (Step 42). The temperature sensor 29 for compressors detects temperature, and a detection value is sent to the microcomputer 30 for control (Step 36). When it exceeds each preset value as compared with the predetermined preset value (d line in a figure shows) set up beforehand (Step 37), the microcomputer 30 for control drives the fan 25 for cooling (Step 38), and cools a compressor 23.

[0019] If the temperature of a compressor 23 falls by cooling of the fan 25 for cooling and it is less from the detection value of the temperature sensor 28 for compressors, and the temperature sensor 29 for discharge pipes (Step 39) (Step 40) and the microcomputer 30 for control stop the fan 25 for cooling (Step 41), and they are continuing surveillance until the detection value of the temperature sensor 28 for compressors and the temperature sensor 29 for discharge pipes exceeds a preset value again.

[0020] [with the cycle of the temperature inside of a refrigerator] as shown in drawing 9 if a compressor 23 stops (Step 43) The delay timer function 33 of the microcomputer 30 for control starts (Step 44). The temperature sensor 28 for compressors and the temperature sensor 29

for discharge pipes detect temperature. While the detection value was sent to the microcomputer 30 for control (Step 45) and the detection value has exceeded the preset value as compared with the predetermined preset value (d line in a figure shows) (Step 46) The fan 25 for cooling was driven, it cooled (Step 47), and each detection value exceeded each preset value (Step 48), and after (Step 49) and predetermined time pass, (Step 50) and the fan 25 for cooling are stopped.

[0021] While the fan 25 for cooling is operating, the rise in heat of the compressor 23 was suppressed by the cooling fan 25 below at permissible maximum temperature (c line in a figure shows), was maintained at the state of the curve B lower than the curve A in the state where the fan 25 for cooling is not operated, and has prevented overheating of a compressor 23.

[0022] Thus, after it did not perform operation of the cooling fan 25 between definite periods of time at the time of starting of a compressor 23 but the temperature of a compressor 23 has risen with the microcomputer 30 for control, while driving By operating the fan 25 for cooling between definite periods of time at the time of a stop of a compressor 23, cooling the remaining heat of a compressor 23, detecting the temperature of the case 28 of a compressor 23, and the discharge pipe 27, and controlling operation of the fan 25 for cooling Without carrying out continuation operation of the fan 25 for cooling (T1+T2 being stop time), a compressor 23 can be cooled efficiently, and change of the quality of ventilation by the setting position of a refrigerator and the rise in heat of the compressor 23 by a season can be followed, and the proper operational status of a compressor 23 can be held.

[0023]

[Problem(s) to be Solved by the Invention] However, in order for the above-mentioned conventional composition to attach a compressor and a discharge pipe, and the close temperature sensor, and to serve as a rise of the cost price of a refrigerator and to also influence this sensor portion by the wind by the above-mentioned cooling fan, there was a fault that exact temperature detection could not be performed.

[0024] This invention solves the conventional technical problem and it aims at offering the control device of the fan for compressor cooling of the refrigerator which can control the above-mentioned cooling fan easily by using an air temperature probe.

[0025]

[Means for solving problem] In order to attain this purpose, the control device of the fan for compressor cooling of the refrigerator of this invention consists of a compressor, a rubber cushion, the fan for cooling, the terminal box of a compressor, an air temperature probe, the microcomputer for control, an operation input circuit, an A/D conversion machine, and a delay timer function.

[0026] [moreover, the control method of the control device of the fan for compressor cooling of the refrigerator of this invention] The above-mentioned delay timer function of the above-

mentioned microcomputer for control is controlled by temperature detected from that of the above-mentioned air temperature probe. When the detection value of the above-mentioned air temperature probe becomes high rather than the temperature set up beforehand, the above-mentioned delay timer function is closed, and starting of the above-mentioned compressor and a drive of the above-mentioned cooling fan are synchronized. Furthermore, when the detection value of the above-mentioned air temperature probe becomes high, the definite-period-of-time above-mentioned cooling fan is made to drive, and it is made to back-stop from a stop of the above-mentioned compressor. If the detection value of the above-mentioned air temperature probe is the temperature range set up beforehand, the above-mentioned cooling fan will be made to drive after definite-period-of-time progress from starting of the above-mentioned compressor. Moreover, in below the temperature to which the detection value of the above-mentioned air temperature probe is set beforehand, the above-mentioned cooling fan does not drive.

[0027]

[Function] The control device of the fan for compressor cooling of the refrigerator of this invention performs control of a cooling fan's delay timer function with the detection value of the air temperature probe conventionally provided in the domestic refrigerator.

[0028]

[Working example] The work example of the control device of the cooling fan for compressors of the refrigerator by this invention is explained below, referring to Drawings. In addition, about the same structure as the former, the same mark is attached and detailed explanation is omitted.

[0029] Drawing 1 is an important section rear elevation by the work example of this invention. Drawing 2 is the block diagram of the control part of a refrigerator. In drawing 1 and drawing 2 , 1 a compressor and 2 a rubber cushion and 3 The fan for cooling, The A/D conversion machine for which build the microcomputer for control and 6 in an operation input circuit, 7 is built in an air temperature probe, and the terminal box of a compressor 1 and 5 are built in the microcomputer 5 for control 8 4, and 9 are delay timer functions built in the microcomputer 5 for control. Drawing 3 is the time chart of this invention which shows the operational status of the fan 3 for cooling, and the temperature change of a compressor 1. Drawing 4 is starting of a compressor and a flow chart at the time of a stop.

[0030] In drawing 1 , in the machinery room formed in the refrigerator lower back, a compressor 1 is fixed to a mount through the rubber cushion 2, indoor cold is inhaled near the compressor 1, and the fan 3 for cooling who sprays towards a compressor 1 is attached.

[0031] In the terminal box 4 of a compressor 1, in order to prevent overheating of a compressor 1, the thermal protector (not shown) was attached, the input was intercepted by overheating of the compressor 1 and destruction by overheating of a compressor 1 is

prevented.

[0032] In drawing 2 , the microcomputer 5 for control memorizes the control mode of a refrigerator with the signal from the operation input circuit 6. Control mode is followed as compared with the predetermined preset value which carried out the A/D conversion with the A/D conversion machine 8 which contains the detection value sent from the temperature-inside sensor attached in the refrigerator warehouse in the microcomputer 5 for control, and was beforehand set as control mode, and on-off control of the operation of a compressor 1 is carried out.

[0033] The microcomputer 5 for control takes the detection value from the air temperature probe 7 into the microcomputer 5 for control, and, simultaneously with starting of a compressor 1, carries out an A/D conversion with the A/D conversion machine 8. As compared with each preset value beforehand set as the microcomputer 5 for control, if a detection value exceeds each preset value (drawing 3 outdoor-air-temperature line h), the cooling fan 3 will be driven and a compressor 1 will be cooled.

[0034] Although the preset value d of drawing 3 changes with the performance of a compressor 1, and designs of a refrigerant circuit, it is set below to the maximum temperature (drawing 3 temperature line c) which guarantees normal operation of a compressor 1.

[0035] In drawing 3 , the compressor 1 of a refrigerator repeats on-off control periodically with the microcomputer 5 for control, and the temperature of the compressor 1 shows a high temperature periodically like Curve A.

[0036] Simultaneously with starting of a compressor 1, the microcomputer 5 for control takes in the detection value from the air temperature probe 7. When the detection value of the air temperature probe 7 exceeds a preset value h, the fan 3 for cooling is driven, a compressor 1 is cooled and the above-mentioned detection value is less than the above-mentioned preset value h as compared with each preset value beforehand set as the microcomputer 5 for control, the fan 3 for cooling does not drive.

[0037] Furthermore, by the delay timer function 9, when the detection value from the air temperature probe 7 is within the limits of preset value h-g, after carrying out definite-period-of-time (1 to 8 minutes) progress from starting of a compressor 1, the fan 3 for cooling is driven and a compressor 1 is cooled.

[0038] Furthermore, when the detection value from the air temperature probe 7 is a high value beyond a preset value g, a delay timer function is canceled and the fan 3 for cooling is driven synchronizing with starting of a compressor 1.

[0039] Thus, while the fan 3 for cooling is operating, the rise in heat of the compressor 1 was suppressed below at the marginal temperature c, was maintained at the state of the curve B below a marginal temperature lower than the curve A in the state where the fan 3 for cooling is not used, and has prevented overheating of a compressor 1.

[0040] [with a state when a compressor 1 starts] when the detection value from the air temperature probe 7 is below g if a compressor 1 stops by the temperature control of a refrigerator The stop time of a compressor 1 and the fan 3 for cooling synchronizes, and when the detection value from the air temperature probe 7 is more than g, after carrying out definite-period-of-time progress from the stop time of a compressor 1 by a delay timer function, the cooling fan 3 is stopped.

[0041] In drawing 4 , if a compressor 1 starts (Step 10), it will set to the air temperature probe 7. If outside temperature becomes beyond in a preset value (g line in drawing 3) (Step 11), the fan 3 for cooling will be driven (Step 12). If the compressor 1 after a certain time progress stops (Step 13) and the delay timer function 9 will start and (Step 14) carry out predetermined time progress (Step 15), the fan 3 for cooling will be stopped (Step 16). In the air temperature probe 7 if outside temperature is within the limits of preset temperature (h-g line in drawing 3) (Step 11) If the delay timer function 9 starts and (Step 17) carries out predetermined time progress (Step 18), the fan 3 for cooling will be driven (Step 19), and if the compressor 1 after a certain time progress stops (Step 20), the fan 3 for cooling will also be stopped (Step 21). In the air temperature probe 7, if outside temperature becomes below in preset temperature (h line in drawing 3) (Step 11), the fan 3 for cooling will not drive (Step 22).

[0042] Efficient cooling of the compressor by the fan for cooling can be carried out easily and inexpensive according to the above-mentioned work example.

[0043]

[Effect of the Invention] As explained above, this invention With a compressor, a rubber cushion, and the fan for cooling The terminal box of a compressor, the microcomputer for control, an operation input circuit, and an air temperature probe, Since the control device of the fan for compressor cooling of a refrigerator is constituted from an A/D conversion machine and a delay timer function, a compressor can be inexpensive cooled easily efficiently with outdoor air temperature, useless power consumption can be held down, and energy saving can also be performed.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The important section rear elevation of the work example of the control device of the fan for compressor cooling of the refrigerator by this invention
[Drawing 2] The block diagram of the control part of the refrigerator of this work example
[Drawing 3] The time chart which shows the operational status of the fan for cooling of this work example, and the temperature change of a compressor
[Drawing 4] Starting of the compressor of this work example, and the flow chart at the time of a stop
[Drawing 5] The important section rear elevation of the work example of the control device of the fan for compressor cooling of the conventional refrigerator
[Drawing 6] The block diagram of the control part of the conventional refrigerator
[Drawing 7] The time chart which shows the operational status of the conventional fan for cooling, and the temperature change of a compressor
[Drawing 8] The flow chart at the time of starting of the conventional compressor
[Drawing 9] The flow chart at the time of a stop of the conventional compressor
[Explanations of letters or numerals]
1 Compressor
2 Rubber Cushion
3 Fan for Cooling
4 Terminal Box of Compressor

[Translation done.]